



Electric Power Disruption

Toolkit for Local Government



Gray Davis
Governor

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Foreword, Purpose and Scope

Foreword	On June 1, 2001, Governor Davis issued Executive Order D-38-01, requiring the Governor's Office of Emergency Services (OES) to develop an implementation plan for notifying the public, public safety agencies, and the media with timely information on imminent and potential electrical blackouts.
Purpose	OES has developed this "Tool Kit" as a supplement to the <i>Emergency Planning Guidance for Local Governments</i> . This "Tool Kit" was developed to identify possible actions that city and/or county governments can take to protect public health and during electric disruptions, regardless of their cause. It also provides preparedness, response, recovery and mitigation actions relevant to electric disruptions.
Scope	<p>This "Tool Kit" identifies the types of electrical disruptions, the types of customers potentially affected, and the types of facilities and populations with critical electrical needs.</p> <p>The "Tool Kit" provides general planning assumptions for consideration by local government in anticipation and reaction to power disruptions, as well as typical criteria that may be used to identify those facilities and populations. This document is not prescriptive but is only intended as guidance.</p>

Disruption Classification, Notification Procedures and Outreach

Classification of Disruptions	<p>The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize different types of outages are possible so that plans may be made to handle them effectively</p> <p>Electric power disruptions can be generally grouped into two categories: Intentional and Unintentional. There are four types of intentional disruptions.</p>
Intentional (Planned) Scheduled	<p>Some disruptions are intentional and can be scheduled. For example, a disruption may be necessary when components of the power system are taken out of service for maintenance or upgrading. Scheduled intentional disruptions can last from several minutes to several hours, and customers are usually notified in advance.</p>
Unscheduled	<p>Some intentional disruptions must be done "on the spot." As a result, advance notice cannot be provided. For example, a fire department or a police department may request a disruption in service during a fire or an accident.</p>
Demand-Side Management	<p>Some customers (i.e., on the demand side) have entered into an agreement with their utility provider to curtail their demand for electricity during periods of peak system loads. In return for agreeing to these disruptions, these customers receive a lower electric rate and/or a rebate.</p>
Load Shedding	<p>When the power system is under extreme stress due to heavy demand and/or failure of critical components, it is sometimes necessary to intentionally interrupt the service to selected customers to prevent the entire system from collapsing. In such cases, customer service (or load) is cut, sometimes with little or no warning. One form of load shedding - called a "rotating blackout" - involves cutting service to selected customers for a predetermined period (usually not more than two hours). As power is restored to one block of customers, power to another block of customers is interrupted to reduce the overall load on the system.</p>

**Unintentional
(Unplanned)**

Unplanned disruptions are outages that come with essentially no advance notice. This type of disruption is the most problematic. The following are categories to classify unplanned disruptions:

- accident by the utility or utility contractor, or others
- malfunction, or equipment failure, due, for example, to age, improper operation, excessive operation, or manufacturing defect; special subcategories cover broken fuse links and underground cable, joint, or termination failures
- overload on either the utility's equipment or a customer's equipment
- reduced capability, that is, equipment that cannot operate within its design criteria
- tree contact other than from storms
- vandalism, or intentional damage
- weather, including ice/snow, lightning, wind, earthquake, flood and broken tree limbs taking down power lines
- wildfire that damages transmission lines

**Notification
Responsibilities**

What follows is a general description of notification responsibilities for electric power disruptions.

**California
Independent
System Operator**

The California Independent System Operator (CAISO) is tasked with managing the power distribution grid that supplies most of California, except in areas serviced by municipal utilities.

Alerts

CAISO uses a series of stage alerts to the media based on system conditions. The alerts are:

- Stage 1 - When the reserve margin falls below 7%
- Stage 2 - When the reserve margin falls below 5%
- Stage 3 - When the reserve margin falls below 1.5%
Rotating blackouts become a possibility when Stage 3 is reached.

Utilities

Utilities generally rely on media releases to inform the public of electric power disruptions. Ongoing emergency coordination between city and county emergency managers and utility providers could enhance advance notification of electric disruptions and restoration coordination.

Outreach

Utility Customers Defined

The term "customer" in this document means the bill payer. A customer may be an individual homeowner, for example. In other words, the number of customers affected is not the same as the number of people affected. Disruption of electrical service to a single customer such as a company office building may, in fact, affect hundreds of individuals.

Utilities

Utilities may provide the following information to public safety agencies, upon request:

- Utilities service area;
- Grid; and,
- Infrastructure information.

OES

OES provides materials to the media, local governments and others on power conservation tips, notifications, preparedness and response activities.

All

Everyone involved in the process of electric power disruptions needs to keep in mind the concept of risk communication. Natural disasters provide no focus for public anger because there is no one to blame. If an event is perceived as "human-caused", the public tends to attribute it to human error, which becomes a focal point for public anger and skepticism. Skepticism can lead to distrust, which can cause over or under reaction.

Preparedness Planning

The concepts used to prepare for floods, earthquakes, and wildfires and other emergencies should be used to plan for electric power disruptions. Electric power disruption plans should address actions to be taken during the four phases of emergency management: preparedness, response, recovery, and mitigation. The main difference is that rotating blackouts are brief, and possibly numerous over the entire summer and beyond, depending on weather and electrical supply. Such events may not merit activating an Emergency Operations Center or declaring an emergency, given the anticipated brief duration of electric disruptions.

Local Governing Boards

Initiation of the planning process may require action by the governing board in the form of a resolution or ordinance that provides local guidance, identifying goals, objectives, providing the authority, intent and the composition of the planning team.

Planning Team

The planning team should be agencies and departments that make up the general emergency management structure since the same problems experienced in other disasters could happen during power disruptions. A planning team may include the following, as determined by the city/county governments:

- management or executive
- city or county counsel
- emergency management
- law enforcement
- fire services
- emergency medical services
- human services (county welfare or city community services, etc)
- schools
- public health agencies
- hospitals and care homes
- community based organizations
- operational area
- public works departments
- utility providers

**General Planning
Assumptions**

In drafting a plan the following assumptions ought to be considered by local governments:

- Government agencies need to reduce electricity consumption, providing an example to the public to conserve.
- Emergency service providers must use electricity to conduct their public safety duties. Many of them are exempt from rotating blackouts, having been identified by the California Public Utilities Commission (PUC) as "essential", and they may also have limited back-up generation capacity.
- Some emergency service providers may not be exempt from rotating blackouts because they have not been designated as "essential."
- The State itself cannot mandate energy efficiency for local government agencies, but can inform local agencies of its importance and encourage reduction strategies where possible.
- Entities may apply political pressure in an attempt to increase the number of "essential" facilities not subject to rotating blackouts, which in turn, could make it more difficult to reduce the use and thus avoid rotating blackouts.
- Rotating blackouts will increase the need for emergency services, thus causing emergency service providers to use more electricity, not less.
- A power disruption response should be flexible enough to enable responders to scale-up for longer duration disruptions.
- Power disruptions may be caused by lighting strikes, wildfires, accidents and maintenance.
- The Standardized Emergency Management System (SEMS) will be used in responding to impacts of electric power disruptions.

Essential and Critical Facilities

Essential Facilities

The loss of electrical service to some facilities can significantly affect public health and safety. Essential facilities as described in this document includes police and fire stations, hospitals, nursing homes, water pumping stations, railroad crossings, and industrial facilities that handle hazardous materials. Many of these facilities may have received exemptions from utilities from rotating blackouts.

Critical Facilities

Suggested ways of identifying Critical Facilities

Critical facilities are buildings, areas, or systems that could experience significant impacts if electrical service was lost. While every home, office, commercial establishment, or industrial factory would be affected by the loss of electricity, some are more vital to the community well being than others. Suggested guidelines for identifying a facility as "critical" could include the following:

Impact on Orderly Functioning

At some facilities, the loss of electrical service can cause significant disruption to the orderly functioning of government, business, and private citizen activities. Although direct health and safety issues may not be a consideration, the loss of electric service can have significant consequences. Examples of these types of facilities include traffic intersections, where heavy congestion can develop; elevator-served, high-rise buildings, where people can be forced to climb many steps to get into or out of the building; auditoriums, where loss of power can create difficulties for a large number of people exiting the facility; and facilities equipped with security alarms triggered by loss of power and that require numerous investigations by local government response personnel.

Impact on the Economy

Some facilities may experience significant economic loss as a result of electrical service disruptions. Examples include industrial factories, food-handling establishments (restaurants, supermarkets), and computer-based businesses. Facility owners may experience economic impacts in the short term (e.g., food spoilage), or the municipality may experience impacts in the long term, such as relocation of businesses that cannot cope with frequent power disruptions.

Impact on Other Infrastructures

Loss of electrical service at some facilities can affect other infrastructures. For example, loss of power at a telephone switching office can interrupt communications, and loss of power at a natural gas compressor station can affect gas delivery. In worst-case conditions, these effects, known as "infrastructure interdependencies," can cascade with drastic consequences.

In applying these general guidelines, more specific criteria must also be considered to ensure that available resources are properly allocated. It is important to identify critical facilities as those that will require significant local government response (e.g., fire, police, emergency medical services, public works) during an electrical power disruption.

Currently, no universally accepted criteria exist for identifying "critical facilities" in all situations. Nevertheless, the table below is offered as a guide.

Types of Typical "Critical" Facilities

Type of Facility	Example	Typical Criteria That Can Be Applied to Determine Criticality
Emergency Services	Police stations Fire stations Paramedic stations Emergency communication transmitters	All facilities considered critical
Water System	Water supply pumping stations Wastewater pumping stations and treatment plants	Facilities needed to provide sufficient pumping capacity to maintain minimum flow rates and minimum pressure
Transportation	Traffic intersections Aviation terminals and air traffic control Railroad crossings Electric rail systems	Major traffic intersections only All aviation facilities All protected rail crossings All electric rail systems
Medical	Hospitals, nursing homes Mental health treatment facilities Specialized treatment centers Rehabilitation centers	All facilities that require a state license to operate Facilities with any patients on electrically powered life support equipment
Schools	Nursery schools, kindergarten, elementary schools, high schools, colleges, business and trade schools	All schools when in session

Type of Facility	Example	Typical Criteria That Can Be Applied to Determine Criticality
Day Care	Registered day care facilities Sitter services After school centers	All facilities that require a state license to operate
Senior	Senior citizen centers Retirement communities	All facilities that require a state license to operate
Social Services	Homeless/transient shelters Missions and soup kitchens Youth, family, and battered person shelters Hearting/cooling shelters	Facilities that require regular fire safety inspections
Detention Centers	Jails Youth detention centers	All facilities
Community Centers	Libraries Civic centers Recreational facilities	Facilities that require regular fire safety inspections
Public Assembly	Sports stadiums, concert auditoriums, theaters, cinemas, religions facilities, shopping malls, conference centers, museums, art centers	Facilities that require regular fire safety inspections
Hotels	Hotels, motels, boarding houses	Facilities that require regular fire safety inspections
High-rise Buildings	Apartments, condos, office buildings	Buildings seven stories or higher
Food Service	Restaurants Grocery stores Supermarkets Food processing facilities	Facilities required to register under tax laws Facilities with significant food quantities stored on the premises
Industry	Hazardous material handling	All facilities

Gathering of Critical Facility Information

Local governments can gather information on critical facilities from various sources. Many local governments already have assembled a list of important facilities as a result of other emergency planning activities.

A key piece of data on critical facilities for electric power disruption planning is the current electrical service at each facility. Besides general information about a facility, it is important to gather the following details:

- utility providers feeder line(s) that serve the facility,
- availability of electric power backup systems,
- type of backup system (e.g., diesel generator, battery system),
- maximum operation time of backup system,
- availability of rapid connection capability for hook-up of portable generators, and
- suitability of the facility as a temporary shelter during widespread, extended outages.

A sample critical facilities survey form (**Attachment 1**) has been included with this document to assist in assessing critical facilities vulnerability.

In addition to using a survey form to gather information, local governments can conduct on-site inspections of selected facilities to determine the specifics of their electric power supply system and to identify any necessary enhancements.

Prioritization of Critical Facilities for Response

Once the information on critical facilities has been gathered priorities should be established for response. Some critical facilities may require an immediate response in the event of any disruption of service because of the potential for immediate or significant public health and safety impacts. Other critical facilities may require a response only in the event of a lengthy disruption. If a widespread disruption affected numerous critical facilities, it may be necessary to allocate available response resources (e.g., police, fire, emergency medical) to those critical facilities most in need. This type of "facility triage" may already exist in other local emergency response plans.

Response priorities for critical facilities will vary according to local requirements and needs. Some factors to be considered are:

- *Length of time before the occurrence of serious impacts.* Critical facilities that may warrant a more rapid response.
- *Nature of potential impacts.* Critical facilities that involve potential public safety impacts may warrant a more rapid response than those with just potential inconvenience impacts

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- *Availability of backup power supplies.* Critical facilities with backup generation capability may not need immediate response.
 - *Number and groups of people potentially affected.* Critical facilities where a large number of people would be affected may warrant a more rapid response than those where only a few would be affected. Also, critical facilities that serve primarily seniors or children may require more rapid response than those that serve primarily able-bodied adults.

Other Considerations

Special Considerations for Infrastructure Interdependencies

As noted previously, in some critical facilities, the loss of electrical service could affect other infrastructures (e.g., telephone switching offices, natural gas compressor stations). These installations, many owned and operated by private companies, are not usually included on a local government's critical facility list. Nevertheless, it is in the best interest of the local government to identify these facilities and discuss with the owners how their facilities should be treated during a power disruption. There could be situations in which the local government could assist the company owner in protecting the facility from, and/or mitigating against, any damage from power disruptions. Such actions should be developed and prioritized by the local government as needed to prevent a cascading infrastructure failure.

The following table may be used as a general guide when deciding how to prioritize critical facility response:

Suggested "Critical" Facility Prioritization

Critical Facility Response Priority	Examples of the Types of Critical Facilities That May Be Included in This Priority Class
Immediate Response <ul style="list-style-type: none"> Highest priority for response under any disruption conditions Potential for immediate, serious impacts Most of these high-priority facilities will have or should have power backup capability. 	Emergency services facilities, including police, fire, and emergency medical services Medical facilities, for example, hospitals, care facilities, etc. Road intersections Railroad crossings Populations on life support equipment
Response in First 2 Hours <ul style="list-style-type: none"> High priority for response for all disruptions up to 2 hours Contact is initiated with all facilities in this category to determine needed response. 	Medical facilities, including nursing homes, care homes and medical offices Schools, especially nursery schools and elementary schools High-rise buildings
Respond in First 6 Hours <ul style="list-style-type: none"> Priority for response when disruptions last longer than 2 hours Response needed within 6 hours Contact is initiated with all facilities in this category to determine the necessary response. 	Water facilities, including water supply and wastewater treatment
Response on Call <ul style="list-style-type: none"> Lower priority, but still critical Response is made upon a request for assistance from a facility. 	Public assembly Commercial or industrial property

Vulnerable Customer Groups

Power-Disruption -Sensitive Individuals

Vulnerable customer groups are different from "essential" or "critical" facilities in that these are individual customers not in a group setting.

Identification of Power- Disruption -Sensitive Individuals

Power-disruption-sensitive individuals are people who would be seriously affected by a disruption in electrical service, including individuals who use electrically powered medical support equipment, elderly people who live alone, mentally diminished and physically disabled individuals. For those people who use medical support equipment (e.g., respirators, automatic medication dispensers), short-term disruptions can be serious or even life threatening.

Some utilities have already identified these individuals and have procedures for notifying them of power disruptions. **Attachment 2 Power Disruption Safety Tips** provides some preventative actions for the general population, elderly and people with disabilities.

Gathering of Information on Power- Disruption -Sensitive Individuals

Collecting information on power-disruption-sensitive individuals can require a great deal of effort and resources. To be genuinely useful, the information must be kept up to date. Ways to gather this information are: 1) use existing government agency contacts, 2) coordinate with local area agencies on aging 3) coordinate with community-based organizations, 4) rely on self-reporting, and 5) have utilities request the information from their customers. **Attachment 3 Vulnerable Populations Identification** is designed to be sent to customers by utilities to develop a database of vulnerable customers.

How social service and emergency response lists are compiled and updated varies widely among communities. In any case, a local government that decides to compile a list of power-disruption-sensitive individuals should first consult with local social service and emergency response organizations to determine whether this information is already available. In addition to local organizations, county and state organizations are also potential sources of this information.

Utilities can also gather this type of information from their customers via a questionnaire enclosed in their bills.

Whatever technique is used to gather information on power-disruption-sensitive individuals, it is extremely important to maintain the privacy of the individuals.

Concept of Operations

Concept of Operations

Local government notifications of power disruptions is dependent on arrangements between local emergency managers and the utility that serves the jurisdiction.

Response to a Notice of An Electric Power Disruption

Response to an electrical power disruption notice should include: initiating deployment of available backup systems, alerting the public, providing them with preparedness tips and moving emergency response equipment and personnel into rapid response positions. Early implementation could decrease the magnitude and impact of any outages.

Suggested Local Government Response to Electrical Disruption Notifications

Action	Agency/Department Initiating Action
Alert local government departments/agencies of potential disruptions such as police, fire, emergency medical, public works.	Local emergency manager
Establish contact with the electric utility representatives.	Local emergency manager
Advise residents and businesses in the jurisdiction. Include notice to check the status of any back-up equipment, and to reduce electric consumption.	Local electric utility
Check the status of local government communication equipment, the availability of generators and fuel.	Public works
Reconfigure traffic patrols to accommodate the flow of traffic through intersections where traffic control devices are inoperable.	Law enforcement
Reduce local government electricity consumption.	All local government departments

Action	Agency/Department Initiating Action
Position crews to operate backup equipment.	Public works
Delay emergency responders shift changes.	Jurisdictional police, fire, emergency medical, public works
Open shelters for persons who may need a cool (in summer) or warm (in winter) place. Consider the use of public pools for extended hours and other public buildings as cool shelters.	Care & Shelter Coordinator
Proclaim an end to the alert.	Local emergency manager

Response During a Disruption

This section addresses procedures for actual disruptions, which may occur without warning at any time of the year.

Limited disruptions affect only a few select customers and extend for short periods of time (less than approximately 2-4 hours). The primary focus here is to respond to the needs of power-disruption-sensitive individuals and/or critical facilities that may be affected. In general, local government personnel on duty can handle a limited disruption. The following chart presents these actions.

Suggested Response to Limited Disruptions

Action	Agency/Department Initiating Action
Determine the possible impact on critical facilities and/or power-disruption-sensitive individuals.	Local electrical utility representative
Dispatch personnel to deal with: traffic issues that include inoperable traffic control devices, railroad crossing gates, downed power lines, fire and security alarms, medical calls for power-disruption-sensitive individuals.	Police Fire Emergency medical services

**Response to
Extended
Disruptions**

Extended disruptions affect a larger area, multiple use customers, and may last for a relatively long time (up to 6 hours or longer). The focus of the response is to identify all critical facilities and power-disruption-sensitive individuals that may be affected and to dispatch personnel to provide assistance. This action could be taken in advance of receiving calls for assistance. Emergency responders may require some prioritization of response.

Suggested Response for Extended Disruptions

Action	Agency/Department Initiating Action
Establish contact with local electric utility representative	Local electric utility representative
Determine the possible impact on critical facilities and/or power-disruption-sensitive individuals. Establish response priorities.	Local government emergency manager
Advise emergency responders (e.g., police, fire, emergency medical services) personnel of the extent of the disruption. Request assistance based on information obtained during phone calls with the affected facilities and individuals.	Local government emergency manager
Dispatch personnel to deal with: Traffic issues Security issues Downed power lines Fire and security alarms Medical needs Critical facility needs Affected local government facilities	Police Fire Emergency medical services Public works
Coordinate with the local electric utility provider to provide support for repair crews.	Local electric utility representative

Response for Large Area Disruptions

When large areas of the jurisdiction, or perhaps the total jurisdiction, are without electric power, the response is essentially the same as for an extended disruption. The only distinction is that a complete prioritization of responses is necessary because local government resources will, in general, not be adequate to meet all the needs for assistance. In addition, it may be necessary to ask for activation of the EOC and/or operational area, as mutual aid may be required. The response actions for extended disruptions is the same for wide area disruptions with the following additions:

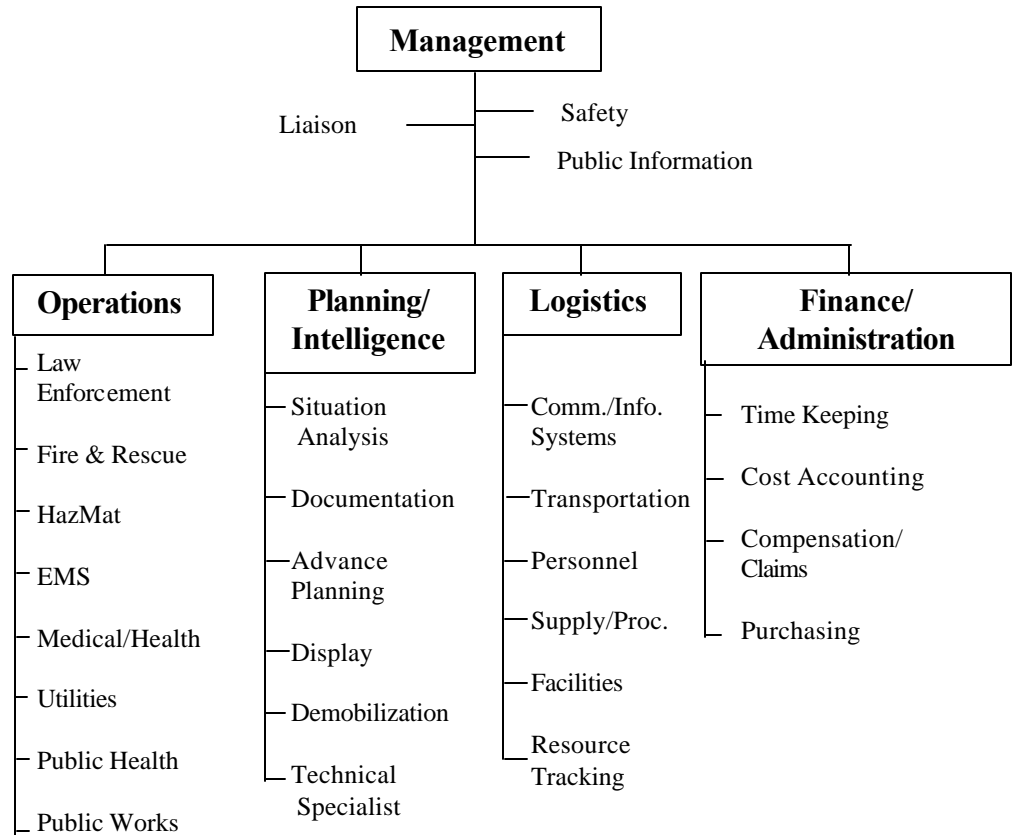
A region wide disruption that affects large portions of local jurisdictions and more than one city or county would involve invoking general disaster plans, activating EOCs and mobilizing the statewide emergency management system.

Suggested Response for Wide Area Disruptions

Action	Agency/Department Initiating Action
Evacuate residents to shelters as needed (e.g., cooling shelters or heated facilities pending on weather conditions).	Emergency medical services, police
Recall emergency staff	Police, fire, emergency medical services, public works, and others as necessary.
Proclaim a local emergency	Local government emergency services director
Activate EOC and activate/request Operational Area activation.	Local government emergency manager
Request assistance under mutual aid	Local government emergency manager

SEMS EOC Organization

The following is an example of what the SEMS structure could be for a large jurisdiction in response to a region wide electrical disruption. The affected jurisdiction would determine the level of activation necessary.



Recovery

Although power disruptions may be brief and frequent, the response and recovery actions may tend to overlap. Documenting effective lessons-learned will improve future responses.

Before a disruption is over and while response actions are still being undertaken, the local electric utility may need support from the local government (e.g., police, fire, public works) to gain entry to equipment sites, to secure repair sites from unauthorized access, or to provide other support services. It is important for local governments to have an established procedure for providing this support to the utility. The communication protocol for the local electric utility to request this support and manner in which local government personnel can provide it should be established before any emergency situation.

Local government staff must know their support limits to avoid dangerous exposure to unfamiliar equipment and should be discouraged from attempting repairs on electrical utility equipment because of potential safety and liability risks.

Immediately after any electrical power disruption event, it is important for the local jurisdiction to evaluate its capabilities and take appropriate action in preparation of future similar events.

When the power returns, all backup and emergency equipment should be returned to standby and be ready for subsequent disruptions. It is important to recognize and be prepared for any emergency at any time, even if one emergency has just concluded. The need to be prepared for any additional emergency conditions that may occur within a short time must be recognized.

Further, after a power disruption conduct an after action review to identify any weaknesses in the overall process and to make corrections. This type of debriefing can help prepare for the next disruption.

Be aware that frequent disruption warnings that do not materialize into an actual loss of service can lead to ambivalence and a temptation to take successive warnings less seriously, to be complacent with preparedness.

Suggested Recovery Actions

Action	Agency/Department Initiating Action
Provide support to the local electric utility repair crews that must repair equipment on public or private property.	Police, fire, public works
Upon notice from the local utility that the situation has been restored to normal, proclaim an end to the event.	Local government emergency director Local government representative
Inform local government departments to revert to normal operations.	Local government emergency manager Local government representative manager
Shut down emergency generation and coordinate the retransfer to local electric utility power.	Local electric utility representative, Public works
Remove portable generators and return them to storage.	Public works
Return backup equipment to standby status and replenish fuel supplies.	Public works
Reset traffic signals.	Public works
Repair buildings, grounds, and street damage.	Public works
Complete damage reports if an emergency was proclaimed.	Local government emergency manager Local government representative
Hold a debriefing.	Local government emergency manager Local government representative
Complete After Action Report and submit to OES Region.	Local government emergency manager

Mitigation

Local governments can take steps that will improve their ability to cope with electric power disruptions in the longer term. These steps include the use of building codes, zoning ordinances, and growth and development projections.

Building Codes

Building codes are used to ensure that construction in a community meets minimum standards required for public health and safety and for quality workmanship. Building codes can also be used to increase a community's ability to deal with disruptions to the electric power infrastructure by requiring facilities to be adequately prepared for power disruptions.

Modification of a building's use can significantly affect electrical service requirements, which may or may not be readily identified on building permits. Some examples of this type of project include the following:

- Conversion of conventional commercial or industrial facilities to computer-based company operations with extensive computer equipment and air-conditioning requirements;
- Conversion of a commercial building to residential condominiums; and
- Rehabilitation of residential buildings to increase their electrical service.

Local governments can use zoning change requests, permit applications, economic development plans, or other informal means to identify modification to rehab projects

Communities that adopt building codes as part of their municipal code - thus making compliance mandatory- frequently use several codes developed by national organizations. While model codes provide basic guidance, municipalities often amend and modify them to meet specific local requirements. The following table serves as a broad outline of the information that could be contained in local codes that are most relevant to increasing a facility's ability to deal with power disruptions.

Summary of Examples of Power Disruption-Relevant Portions of Typical Building Codes

(Check these with your applicable existing building codes.)

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| <ul style="list-style-type: none"><input type="checkbox"/> Provide definitions and requirements for 15 classes of facilities and 10 special structures.<input type="checkbox"/> For most facility classes and special structures, mandate the use of emergency lighting for means of egress.<input type="checkbox"/> In the event of a power disruption, lighting must have battery backup to last at least 1.5 hours.<input type="checkbox"/> Require the use of standby power (e.g., backup generators) for high-rise (i.e., more than 75 feet high) buildings<input type="checkbox"/> Provide definitions and requirements for structures falling into 10 use groups and 21 special-use and occupancy facilities.<input type="checkbox"/> Define an "emergency electrical system" as a system designed to pick up essential loads within 10 seconds of a power disruption. Define a "standby power system" as a system designed to pick up selected loads (other than those classified as emergency use) within 60 seconds of a power disruption.<input type="checkbox"/> Require the use of standby power systems in high-rise buildings. A 2-hour fuel supply must be on site.<input type="checkbox"/> Require the ability to connect emergency communications equipment, emergency lighting, fire pumps, and at least one elevator to the standby system.<input type="checkbox"/> Provide requirements for electrical equipment, including additional requirements for 25 special occupancy facilities.<input type="checkbox"/> Prescribe requirements for emergency systems designed to provide backup power for facilities and equipment essential for safety reasons. Battery systems must have 1.5-hour capability. Generator systems must have an on-site fuel supply for 2 hours of operation, unless the system is natural-gas-fueled and the probability of simultaneous failure of the electric and natural gas supplies is considered to be low.<input type="checkbox"/> Prescribe requirements for "legally required standby" systems, which are designed to provide backup power for equipment whose disruption, could create hazards or hamper fire-fighting efforts. Battery and generator requirements are similar to those for emergency systems.<input type="checkbox"/> Prescribe requirements for "optional standby" systems, which are designed to provide backup power for non-safety-related equipment.<input type="checkbox"/> Establish requirements for health care facilities, including hospitals, nursing homes, limited care, supervisory care, clinics, medical and dental offices, and ambulatory care. Describe requirements for alternate sources of power, including on-site generators, battery systems, and multiple feeders from the utility supply.<input type="checkbox"/> Provide requirements for specific facilities, operations, and materials handling.<input type="checkbox"/> Require a transfer of time of 10 seconds or less and require an on-site fuel supply for a minimum of 2 hours for facilities requiring emergency generators. |
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- ☐ Provide installation criteria and maintenance practices for emergency power systems.
 - ☐ Classify emergency power supply systems (EPSS) by type, which specifies the time needed to have the EPSS pick up the load, and which ranges from essentially instantaneous (uninterruptible power supplies) through 10-120 seconds, to manual with no time limit.
 - ☐ Specify how long the EPSS can operate without fueling, and which ranges from 5 minutes to 48 hours.
 - ☐ Permit EPSS fuel sources to be liquid petroleum products (e.g., diesel fuel), liquefied petroleum gas (LPG), or natural gas.
 - ☐ Set requirements on transfer switches that moves the load between the utility supply and the EPSS.
 - ☐ Set safety and environmental requirements for EPSS.
 - ☐ Provide performance and safety requirements for stored electrical energy, batteries, mechanical energy storage, and motor generators systems used for emergency purposes.
 - ☐ Provide requirements for backup power installed in industrial and commercial facilities.
 - ☐ Identify emergency power needs in commercial and industrial facilities, including lighting, start-up power, transportation, mechanical utility systems, heating, refrigeration, production, space conditioning, fire protection, data processing, life support and life safety systems, communication systems, and signal circuits.
 - ☐ Provide standards for generators and utility emergency power systems.
 - ☐ Provide requirements for design, construction, operation, inspection, maintenance, and repair of elevators, including handling power failures.
 - ☐ Provide requirements for health care facilities.

Zoning Ordinances

A case in point, portions of the City of Chicago's Municipal Code may be used as an example of how codes are adapted to meet local conditions. The following tables summarize some of the features of the City of Chicago's code:

City of Chicago Chapter 13-76: High-rise Buildings

This chapter covers all new buildings more than 80 feet above grade.

- ☐ It requires a System II emergency system. In addition to supplying emergency lights, the system must supply a fire department emergency access elevator to all floors, a communication system, and fire command and alarm systems.
- ☐ All buildings more than 400 feet above grade must have a diesel-driven emergency generator for fire pumps.

All existing and new residential buildings more than 80 feet above grade must have either an on-site generator or an approved battery system for emergency lights. The fuel source for the generator in buildings more than 80 but under 400 feet above grade can be natural gas or diesel. In buildings more than 400 feet above grade, the fuel source must be diesel.

City of Chicago Chapter 14-4: Emergency Systems

This chapter covers requirements for emergency and exit lighting systems.

- ☐ System I emergency systems are defined as consisting of three sources of electric power: the normal supply, an auxiliary source, and a final reserve source. The auxiliary source can be an alternative supply from the electric utility (e.g., connection from a second service line, connection to and alternate feeder) or an on-site generator. The final reserve source can be from an on-site generator or a battery system. System I is required in the following structures:
 - homes for the aged (with two or more floors or more than 20 persons)
 - hospitals
 - school halls (with fixed seats)
 - theaters
- ☐ System II emergency systems are defined as consisting of two sources of electric power: the normal source and an auxiliary source. In residential buildings more than 80 feet above grade, the auxiliary source must be an on-site generator or a battery system. System II is required for the following:
 - hotels
 - infirmaries
 - schools (with more than 100 students)
 - school halls (without fixed seats)

System III emergency systems are defined as consisting of two sources of electric power: the normal source and an auxiliary source. The auxiliary source must be from an approved source that supplies only the exit and emergency lights. System III is required in the following structures:

- jails
- libraries
- motels
- police stations (with two or more floors or more than 20 persons)
- residential buildings (more than 80 feet above grade)
- rooming houses (with two or more floors or more than 20 persons)
- schools (with fewer than 100 students)

- ☐ Battery units must operate for a minimum of 2 hours.
- ☐ Generators must be able to pick up the load within 10 seconds.
- ☐ An on-site fuel supply must be available for 4 hours operation. The generator is allowed to pick up selected emergency loads other than lighting.
- ☐ Sets safety and environmental requirements for the SEPSS.

Zoning ordinances stipulate the type of land use that is acceptable in various locations in a community. Zoning can significantly affect the electric power requirements of an area. For example, an area zoned "residential" will have a very different electricity load profile than an area zoned "commercial" or "industrial."

There are two ways in which zoning can affect the electric power infrastructure. First, zoning plays a role in determining the location of a site for electric power facilities, including power plants, transmission lines, and substations. The current trend of constructing many small and medium scale "peaker" power plants has ignited zoning controversies. Many communities are now developing policies and zoning ordinances that will affect the location of these facilities.

It is important for a community to understand that the location (or restrictions on the location through zoning) of electric power facilities within its boundaries may (or may not) directly affect the reliability of the power supply to that community. A community that is home to a peaker plant, for example, does not necessarily enjoy more reliable service. Likewise, not having a power plant does not imply decreased reliability. Electric power plants are built to provide power to the entire electric grid, not just to the area in which they are located. However, a distribution substation, which connects customers to the grid, will directly affect the reliability of electrical service in the area in which it is located.

**Growth and
Development
Projections**

All electric power companies develop projections of long-term demand as a starting point for planning the expansion of electric power generation, transmission, and distribution facilities. Projections are made for a range of planning horizons (from 1 to 20 years) and for a range of geographical resolutions (for the entire system to individual distribution substations and feeder lines). In general, the shorter the planning horizon and the larger the geographic resolution used, the more likely the demand forecast will be reasonably representative of the actual situation.

Zoning affects the electric power infrastructure because it influences and is influenced by the type and rate of development. During the last 25 years, local government has established a major trend toward using zoning- and the closely related ability to control the local subdivision of land - to regulate growth.

Final Note**Legal and
Regulatory
Requirements**

Some solutions considered in planning for a local electric power disruption cannot be implemented without obtaining special legal and regulatory authority. Local governments should fully engage legal counsel to ensure that all necessary authorizations are in place.

Further, some actions could subject the local government to liabilities. Again, proper legal measures should be in place to address these liabilities.

**Coordination
With the local
Electric utility**

A local electric power disruption preparedness plan should be coordinated with the local electric utility service providers. Many aspects of a plan require close cooperation between the local government and the utility. These issues should be worked out and agreed upon in advance, before the disruption occurs, to ensure an efficient and effective response.

Information Sources

The information in this guidance is based on materials that were developed by OES, the City of Chicago, California's utilities and numerous public and private sector agencies. For more information, please see the following websites:

California Governor's Office of Emergency Services

www.oes.ca.gov

California Energy Commission

www.cahwnet.gov

California Department of Health Services

www.dhs.ca.gov

Pacific Gas and Electric

www.pge.com

San Diego Gas and Electric

www.sdge.com

Southern California Edison

www.sce.com

California Independent System Operator

www.caiso.com

California Municipal Utilities Association

www.cmua.org/aboutcmu

Emergency Medical Services Authority

www.emsa.ca.gov

Local Area Agency on Aging

www.c4aging.org

American Association of Retired Persons

www.aarp.org

California League of Cities

www.cacities.org

California State Association of Counties

www.csac.counties.org

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State of California, Governor's Office, June 1, 2001

Implementation Plan For Executive Order D-38-01 Final Draft,
State of California, Office of Emergency Services, June 14, 2001

Application for Exemption from Rotating Power Disruptions,
California Public Utilities Commission, May 2001

City Response Program for Electrical Power Emergencies,
City of Chicago, Department of the Environment, Updated May 2001

Chicago Energy Emergency Response Plans,
City of Chicago, Department of the Environment, May 21, 2001

*Critical Infrastructure Assurance Guidelines for Municipal Governments:
Planning for Electric Power Disruptions,*
Metropolitan Mayors Council, City of Chicago, U.S. Department of
Energy, February 2001

Summer Safety Tips,
Fresno-Madera Area Agency on Aging, May 9, 2001

*Fact Sheet: Fresno-Madera Area Agency on Aging Energy Crisis Safety
Fact Sheet for Seniors,*
Fresno-Madera Area Agency on Aging, May 9, 2001

Federal Emergency Management Agency,
Fact Sheet: Winter Storms, November 18, 1998

Attachments

- Attachment 1:** Sample Critical Facilities Utilities Form
- Attachment 2:** Power Disruption Safety Tips
- Attachment 3:** Vulnerable Population Identification Tips and Samples

Attachment 1

Sample Critical Facilities Survey Form

(Referred to on page 16 of the *Emergency Planning Guidance for Local Governments*)

City of _____
County of _____

Date: _____

Facility Name: _____

Location Information

Facility Address: _____
_____ Zip Code: _____

Street/Road Intersection (if no street address is available): _____

Facility Geographical Coordinates (if known):

Latitude: _____ Longitude: _____

Contact Information

Contact Person – Business hours: _____

Phone: _____ Fax: _____ Email: _____

Contact Person – Non-business Hours: _____

Phone: _____ Fax: _____ Email: _____

Facility Category (*check all that apply and circle the subcategory in parentheses*):

___ Emergency Services (police, fire, emergency medical, disaster agency, 911 center)

___ City/County Office

-
-
- ___ Water Facility (water supply, well, water tower, pumping station, wastewater treatment, lift station)
- ___ School (pre-school, kindergarten, grade school, middle school, high school, college, trade school)
- ___ Community Center (library, municipal recreation facility)
- ___ Transportation (road intersection, rail crossing, airport)
- ___ Telecommunications Facility (switching office, transmitter, repeater)
- ___ Medical (hospital, emergency center, medical office, nursing home, assisted living, animal care)
- ___ Public Congregation (recreation facility, auditorium, place of worship, theater, shopping center)
- ___ Day Care (children, handicapped, elderly)
- ___ Multi-unit Residential (low rise, high rise, senior)
- ___ Hotel
- ___ Other Government Facility
- ___ Commercial
- ___ Industrial
- ___ Other (specify) _____

Electrical Service

Feeder Circuits (if known): _____

Current Electrical Service Inputs (if known): _____

Voltage (V): _____ No. of Phases: _____ No. of Wires: _____

Backup Equipment

Is an On-site Backup Generator Available? Yes___ No___

If Yes, Give Type of Generator: _____ Diesel: _____ Natural gas: _____ other: _____

Generator Capacity (kw): _____

Portion of the Facility's Normal Load that the Generator can handle: _____%

On-site Fuel Storage Capability / Time Generator can operate before refueling: _____

Generator Transfer Switch: Automatic: _____ Manual: _____

Uninterruptible Power Supply (UPS) available: Yes_____ No_____

UPS Capacity (amp-hours): _____

Equipment Connected to UPS: _____

Time UPS can operate before recharging: _____

Rapid connection switches for portable generation available: Yes_____ No_____

Shelter Capability

Is the Facility available as a shelter?

For Summer cooling: Yes_____ No_____

If Yes, give the approximate shelter capacity (No. of people): _____

For Winter warming; Yes_____ No_____

If Yes, give the approximate shelter capacity (No. of people): _____

If Yes, are toilets and shower facilities available? Yes_____ No _____

Additional Comments:

Attachment 2

Power Disruption Safety Tips

General Public

What Should I Do?

- Meet with your family and/or neighbors to discuss the disruptions and how to prepare and respond.
- Have a plan for medically fragile friends and relatives. If they use life support equipment, know if the equipment has a battery backup and test it.
- Know and watch for signs of heat stress, particularly in small children and the elderly and medically fragile.

During Summer

- Be aware of days of extreme heat predictions by listening to the radio, TV and/or reading the paper.
- Stay indoors and avoid extreme temperature changes.
- Wear light colored, lightweight and loose fitting clothing.
- Make appointments for the doctor, shopping etc. in the morning.
- Prevent dehydration by drinking at least 6-8 glasses of fluids every day.
- Avoid coffee, caffeine containing soda, tea and alcohol.
- Avoid any direct exposure to the sun. If you must go outside, wear sunscreen, a hat and conduct outdoor activities during the coolest part of the day.

During Winter

- If you go outside for any reason, dress for the season and expected conditions: For cold weather, wear several layers of loose-fitting, lightweight, warm clothing rather than one layer of heavy clothing. Outer garments should be tightly woven and water-repellent.
- Mittens are warmer than gloves.
- Wear a hat.
- Cover your mouth with a scarf to protect your lungs from extremely cold air.
- Wear sturdy, waterproof boots in snow or flooding conditions.
- Conserve fuel, if necessary, by keeping your house cooler than normal.
- Temporarily shut off heat to less-used rooms.
- If using kerosene or propane heaters, maintain ventilation to avoid build-up of toxic fumes.
- Keep heaters at least three feet from flammable objects
- Refuel kerosene or propane heaters outside.
- Avoid travel, if possible. If you must travel, do so during daylight.
- Don't travel alone.
- Stay on main roads, and keep others informed of your schedule.

Special Concerns

- Health concerns associated with a rise in temperature include heat cramps, heat fatigue, heat syncope, heat exhaustion, or heat stroke.

General signs and symptoms of heat related health problems include weakness, dizziness, nausea, and/or muscle cramps.

For heat cramps, heat fatigue, or heat syncope

- You should stop the activity which caused the symptoms and move to a cooler environment if feasible. If you have other medical concerns, you should contact your physician.

For heat exhaustion

- Seek immediate medical attention. Do everything possible in the interim of medical advisement inclusive of moving to a cooler environment as feasible, minimize activity, drink water or juice, and use cool wet cloths on the body.

Signs and symptoms of heat stroke include sudden high temperature, headache, rapid heartbeat, difficulty breathing, rapid breathing, profuse sweating, muscle rigidity, confusion/altered mental status and/or possible seizures.

For heat stroke

- Call 911 immediately, as this is a medical emergency. Be sure to move to a cooler environment as feasible, apply cold water compresses to the body or immerse your body in cool water while waiting for medical transport.

Frostbite

Frostbite is a severe reaction to cold exposure that can permanently damage its victims. A loss of feeling and a white or pale appearance in fingers, toes, or nose and ear lobes are symptoms of frostbite

Hypothermia

Hypothermia is a condition brought on when the body temperature drops to less than 90 degrees Fahrenheit. Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness, and exhaustion.

For Frostbite

If frostbite or hypothermia is suspected, begin warming the person

or

slowly and seek immediate medical assistance. Warm the person's trunk

Hypothermia

first. Use your own body heat to help. Arms and legs should be warmed last because stimulation of the limbs can drive cold blood toward the heart and lead to heart failure. Put person in dry clothing and wrap their entire body in a blanket.

Never give a frostbite or hypothermia victim something with caffeine in it (like coffee or tea) or alcohol. Caffeine, a stimulant, can cause the heart to beat faster and hasten the effects the cold has on the body. Alcohol, a depressant, can slow the heart and also hasten the ill effects of cold body temperatures.

What Will I Need?

- An extra three-day supply of any needed medication or medical supplies.
- A first aid kit for your home.
- A battery-powered radio with fresh batteries (this may be your only source of information during the disruptions).
- Additional supplies for special needs (i.e. infants, seniors, pets).
- Have reserve supply of bottled water.

Seniors and/or Persons with Disabilities

- Contact the local electrical utility company in advance about any specific needs regarding machines or other life-sustaining devices that depend on electricity. If lack of electricity would create an immediate threat to life or safety, local public safety agencies should also be given advance notification.
- To expedite emergency response, house numbers should be readily visible from the street.
- For people using battery-powered mobility or breathing equipment, assure that batteries are fully charged each day. Contact your medical equipment provider to be aware of their ability to assist during a power disruption.
- Establish a support network of friends and neighbors who can check in periodically if the power is out, to assure that assistance is available if needed.
- Keep a flashlight or lantern equipped with fresh batteries within easy reach, so that some light is immediately available if the power does go out. For people with limited reach or grasping ability, inexpensive battery-operated touch lamps are a good option. Such lights can be installed in areas of greatest use, and are small enough to be carried in an emergency. Do not use candles or oil lamps for light in an emergency, as they can be fire hazards.
- Store supplies of medicine and drinking water so they will be readily accessible in the event of a power disruption. Some household water supplies may be disrupted during power disruptions.
- Assemble a 10-day supply of prescription medications and durable medical goods and store them in a convenient location, in the event that a prolonged electrical disruption or other emergency should require evacuation.
- A copy of emergency contact numbers and current prescriptions should be stored in the same location.
- Cordless telephones may not work during a power disruption, so consider keeping a standard phone plugged into a second phone jack in case it is ever needed. A cellular phone is also a good backup option, but be aware that in a widespread emergency any communication network may quickly become overloaded with calls.

-
- o When an electrical disruption occurs, turn off all appliances, computers and lights except for one that will indicate when power has been restored.
 - o Food Safety - Perishable food should not be held above 40 degrees for more than 2 hours. During a power disruption, do not open the refrigerator or freezer, as an unopened refrigerator will keep food cold enough for a couple of hours. If the refrigerator was out for more than 2-4 hours, you are best to discard perishables.

**For Further Information, Contact Your Local
Emergency Management Agency, American Red Cross or Council on
Aging**

Attachment 3

Vulnerable Population Identification

The following is a tool that public safety agencies may use to request information directly from vulnerable (i.e., life support) customers. Its use is as follows:

1. Public safety agencies that desire additional information regarding vulnerable persons within their jurisdiction may create a letter and/or survey. This letter should be developed in consultation with the affected utility. An example is provided.
2. Public safety agencies may then request the utilities to send out the letter to those customers that may be vulnerable to power-outages included within the public safety agency's jurisdiction. The public safety agency should consult with the utilities to determine the appropriate recipients of the letter and/or survey.
3. Utility customers that want to self identify their vulnerability to power outages may return the completed survey directly to the public safety agency.
4. Public safety agencies are responsible for maintaining the confidentiality of the personal information (name and address) of any customer that replies to the survey.

Public Safety Agency Letter and Form For Identifying Power-Outage-Sensitive Individuals

Dear resident:

You or someone at this address has been identified by your power utility as a resident on the life support and/or medical baseline rate. Therefore, you may be more sensitive to power interruptions. Your local public safety agency is identifying individuals that may be particularly vulnerable during electrical power outages. These are individuals that use life-sustaining equipment at their homes due to serious medical conditions, significant physical or mental impairments, or other limitations and would be adversely affected by an interruption in power. If you believe you qualify and would like to participate, please complete and return the attached survey. Your participation is appreciated but is completely voluntary.

Please note that your participation to this survey does not imply any additional services or obligations toward you from your local public safety agency. This information may be used to assist your local public safety agency to develop emergency plans or procedures to better serve the community during electrical power outages. The local public safety agency will determine the appropriate use of this information

Completed surveys should be sent to the following address:

Name of Public Safety Agency
Mailing Address
City, State, Zip Code

(Signed)

For questions, additional surveys, or information contact:

(Name of Public Safety Agency)

(Telephone)

Public Safety Agencies: Please treat as confidential all individual personal information contained in accompanying forms.

Power-Outage-Sensitive Survey Form
For _____

(Name of Public Safety Agency)

Date: _____

Name: _____

Street Address: _____ **Zip Code:** _____

Mailing Address: _____ **Zip Code:** _____

City/County: _____

Phone: (____) _____

Reason For Power-outage Sensitivity: _____

Do you have any medical equipment that requires uninterrupted electric power?

Yes _____ **No** _____

What type of electrically powered medical equipment do you use? _____

How often do you use this equipment? _____

During what periods of the day do you use this equipment? _____

Do you have a backup power supply for this equipment (e.g., battery)?

Yes _____ **No** _____

If yes, please describe the backup power supply and approximately how long it can operate the equipment:

Please read the following, sign, and return this form to:

Name of Public Safety Agency
Mailing Address
City, State, Zip Code

The undersigned understands and agrees that the above information is for informational purposes only and shall not be construed under any circumstances to create any special duty or relationship of any kind between the undersigned and the

_____ to provide police, fire or emergency services beyond
(Name of Public Safety Agency)

those afforded to the general public.

The undersigned understands and agrees that the names, telephone numbers, and nature of the medical condition listed above can be released to the emergency and law enforcement agencies responding to a call for assistance and that this information may be broadcast by dispatchers over emergency radio frequencies to responding emergency personnel.

Signature: _____

Public Safety Agencies: Please treat as confidential all individual personal information contained in accompanying forms.

